**Wisconsin Highway Research Program**
**Request for Proposal for**

# Analysis of Trends/Correlations of Historical WisDOT Soil Laboratory Test Results Through Development of an Electronic Database

**Proposals must be submitted**
**no later than**
**Wednesday, March 3rd, 2010**

**For further information regarding this RFP**
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**January 27, 2010**

## Researcher Proposal Preparation Guidelines

WHRP Proposal Guidelines are available on the WHRP website (http://www.whrp.org/rfps-and-guidelines.html?current=three&sub=none). Please refer to these instructions in preparation of your response.

## I. PROBLEM TITLE

Analysis of Trends/Correlations of Historical WisDOT Soil Laboratory Test Results Through Development of an Electronic Database

## II. BACKGROUND AND PROBLEM STATEMENT

The Wisconsin Department of Transportation (WisDOT) will continue to build, maintain and rehabilitate existing transportation facilities, similar to what has been done in the past. In much of this work, the underlying soil characteristics do not change over time. Over the years, WisDOT has performed many laboratory tests on soil samples collected for the design and construction of these various transportation facilities located throughout the state. Generally these laboratory results are in paper file format. This does not allow easy retrieval or analysis for trends or correlations between records. Because of this, there appears to be a large benefit from organizing this data into an electronic format that can be easily searched/analyzed and used for future WisDOT projects. Development of this database and the associated trends/correlations will allow future designers to review this past information, which will be very useful during planning/early design stages and later, in developing subsurface investigation programs.

The focus of this research project will be to collect existing WisDOT soil laboratory data, organize it in an electronic database and then analyze for trends and correlations. Work will also link these records to a Geographic Information System (GIS) so they can be searched by spatial location. The researcher will then analyze this database to investigate for trends relating to soil type/classification, geological source, index properties, structural design values, etc. and compare to typical published values with the respective soil types. The database should be developed to allow for easy searches and simple input of additional test results after they are obtained.

## III. SCOPE

This study can be separated into three phases. In the first phase, the researcher should obtain and review available literature pertinent to this study. This would include academic research, available software packages and practices of other state highway agencies in this area. Work should also be done to determine the existing format of the available WisDOT data. This information should be applied to the second phase of the study. Prior to development of the database, the researcher will discuss the potential database and GIS formats/platforms with the Department and arrive at systems that are compatible with WisDOT systems. The database should be easily searchable and linked to a GIS system to allow for locational searches. Existing similar WisDOT databases should also be researched to determine compatibility and the potential for unification/linking. It also needs to allow for easy input of future laboratory data as it is obtained. This second phase will be collection and input of the available data into the

database. Each of the eight WisDOT offices, and the Statewide Geotechnical office, has paper copies of laboratory test results to enter into the database. The researcher will travel to each of these locations to collect this information and input into the database. The Statewide Geotechnical office has approximately 1000 individual records (dating to 1990+/-), each composed of several test results. This office also has access to additional, earlier test records. The third phase of the project will involve analysis of the collected data to investigate for trends and correlations relating to soil types, geological aspects, classifications, index/structural capacities, routine/sophisticated test comparisons, etc. These results should also be compared to published values for similar soil types and testing. The database, and all data, findings, and conclusions will be presented in a final report. This report should also discuss future additions to the database, proposals for inclusion of consultant work, necessary user training, and recommendations for placement and access of the database on the WisDOT system.

## IV. SPECIFIC RESULTS, FINDINGS, TOOLS, ETC.

This research effort will produce an electronic database of past WisDOT geotechnical laboratory test data. In addition, trends/correlations of soil data will be developed to allow for soil characterization on future projects in the planning/development stages. This study has the potential to improve the planning/budgeting accuracy of future WisDOT projects, refine future subsurface investigation programs and increase knowledge of representative types of soils throughout the state. Work will include providing recommendations for WisDOT IT location of system, future data input (including consultant data) methods, and necessary user training. A final report will be required documenting all research findings and conclusions.

## V. LENGTH OF RESEARCH PROJECT AND APPROXIMATE COST

It is estimated that that the time required for this project will not exceed 24 months. A draft final report should be submitted in electronic format after month 21 to accommodate Departmental review, scheduling of the final presentation and incorporation of review comments in the final report. The researcher will deliver 36 paper copies of the final report, along with an electronic version. The estimated cost should not exceed $64,000.

## VI. URGENCY AND POTENTIAL BENEFITS

WisDOT will continue to build, maintain and rehabilitate existing transportation facilities in the future. In much of this work, the basic characteristics of the underlying soils do not change over time. It would be very useful to have some preliminary subsurface information in the early design/planning stages to allow better scoping and development of more accurate project budgets. This research project has the potential to assist in

both of these areas and to help refine future WisDOT subsurface investigation programs, resulting in design cost savings. Results are not intended to replace future Geotechnical work, but to provide information that can be used to better refine future subsurface investigations.

## VII. ADDITIONAL REQUIREMENTS FOR IMPLEMENTATION

The results of the study will produce an electronic database and analysis of existing WisDOT laboratory soil test results, also it will allow for easy updates as new data is obtained. This database will be connected to a GIS system to allow easy searches in specified geographic areas. Analysis will also be done to investigate for test result correlations with geology, soil types, property relationships, published values and/or other trends. WisDOT use, distribution, and maintenance of this database will be determined by the Department. Coordination with Departmental computer personnel will be required to investigate current similar WisDOT databases, select compatible software platforms, access, location and new data entering procedures. This work is beyond the scope of this research effort.